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THE GENUS *STRICTISPIRA* IN THE WESTERN ATLANTIC (GASTROPODA: CONOIDEA)

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ABSTRACT

The genus *Strictispira* [formerly Turridae, now Strictispiridae] in the western Atlantic area is reviewed. Two new species, ***S. redferni*** and ***S. coltrorum***, are proposed. *Crassispira quadrifasciata* (Reeve, 1843) is reassigned to *Strictispira*. Three additional species – *S. drangai* (Schwengel, 1951), *S. paxillus* (Reeve, 1845), and *S. solida* (C. B. Adams, 1850) – are discussed. *Drillia acurugata* Dall, 1890, regarded as a Recent species as well as fossil and as a *Strictispira*, is shown to be fossil only, with Recent specimens considered to be that species here regarded as *S. redferni*. Similarly, *Drillia ebenina* Dall, 1890, initially a fossil species and often considered to be Recent and a synonym of *S. solida*, is shown to be fossil only. Recent specimens identified as *S. ebenina* are regarded as *S. solida*. Characteristics of the genus and species were studied, and are here described and illustrated, including shell morphology, opercula, and anatomy – especially foregut anatomy and radular structure. Comparisons are made with similar-appearing species, both within the genus and in other genera. The feeding mechanism of strictispirids is probably by ingestion aided by grasping of the prey by extruded radular teeth, followed by rasping and tearing of the prey by the teeth. The protoconch is paucispiral, indicating direct development. The genus has a western Atlantic distribution from the lower eastern Carolinian province to the Caribbean/West Indian province, including both sides of Florida, the Florida Keys, Mexico and Central America, the Greater Antilles, Virgin Islands, Lesser Antilles, lower Caribbean, and the Brazilian province.

Key words: *Strictispira*, taxonomy, shell morphology, radular structure, foregut anatomy.

INTRODUCTION

The genus *Strictispira* was established by McLean (1971a: 125) for crassispirine-like tropical eastern Pacific species bearing a distinctive radular structure and teeth. The genus was placed in a new subfamily Strictispirinae of the family Turridae. The family Turridae has recently been reclassified by Taylor et al. (1993), with some of the subfamilies elevated to family level, the Strictispiridae among them. This classification is used here. McLean (1971a: 123–125) described the subfamily and the genus, described and illustrated the radulae of the eastern Pacific species (1971a: figs. 86, 87), and pointed out the characteristics of the sinus structure of the group.

Discussing Strictispirinae, McLean commented (1971a: 124) that he was "much indebted to Virginia Maes for an exchange of ideas concerning the group, of which she has for some time been aware." The late Virginia Maes had specialized in the family Turridae for some years, and, although she published only sparsely, became one of the authorities on that large group. She meticulously curated the turrid collection at the ANSP. With regards *Strictispira* species, McLean commented (1971a: 125) that *Drillia ebenina* Dall, 1890, a western Atlantic species originally described as fossil, is also a member of the genus. He said (1971b: 730), with regard to the eastern Pacific *Strictispira stillmani* Shasky, 1971, "*Strictispira ebenina* is a related Caribbean species". There has been confusion as to whether *Drillia ebenina* and *Pleurotoma solida* C. B. Adams, 1850, are conspecific. I believe that Recent specimens identified as *S. ebenina* are in fact *S. solida*. Collections at both the USNM and the ANSP show mixing of the two identifications. At the ANSP, Recent material considered *S. ebenina* was maintained separate but following *S. solida*. Review of these shows that they are *S. solida*. It is probable

that Maes had identified *S. solida* as strictispirid, because a specimen (ANSP 282214) from Belize with soft parts had been collected in 1961 by Robert Robinson of the ANSP. Maes's card files contain a card with photographs of the shell and one showing the radula, which bears typical strictispirid teeth. Although now assigned to *Strictispira*, the specimen was without identification originally. It was located in the *S. ebenina* section, probably having initially been considered that on Maes curating this material.

In the course of her studies Maes had synonymized various species. These synonymies were seldom published, but have been listed in Malacolog, the online database of the western Atlantic molluscan fauna created at the ANSP by Gary Rosenberg, and have therefore circulated among malacologists. *Pleurotoma solida* with *Drillia ebenina* as a synonym is an example.

Further, Maes (1983) identified *Pleurotoma paxillus* (Reeve, 1845) as a *Strictispira* and demonstrated other significant strictispirid anatomical features, including the lack of a poison gland and bulb. She also pointed out that the characteristic sinus structure ("turrid notch", on the shoulder slope in this case, not to be confused with the "stromboid notch" on the lower lip) of the group is not restricted to the strictispirids but also occurs in some western Atlantic crassispirine species. She further commented about the difficulty differentiating the shells of *S. paxillus* and *S. solida*, plus such other similar-appearing species as *Crassispirella fuscescens* (Reeve, 1843) and *Crassiclava apicata* (Reeve, 1845). Kantor et al. (1997), in a cladistic study based on considerable foregut research of crassispirine species, suggested that the conventional subgenera of *Crassispira* be raised to generic level. This is followed here, thus *Crassiclava* and *Crassispirella* are assigned generic level, *Crassispira* remaining at generic level but without subgenera.

Taylor et al. (1993) reviewed the foregut anatomy of strictispirids, illustrating the radular structure and teeth, noting absence of a poison apparatus, and showing that the buccal mass is positioned at the anterior end of the proboscis, the buccal tube being short, and they discussed the feeding mechanism. Kantor & Taylor (1994) reviewed *S. paxillus* in the light of a study of Maes's material, including analysis of serial sections, pointing out and illustrating details of the foregut anatomy (compared here with the present findings).

In the tropical eastern Pacific, *Strictispira* contains two species, *S. ericana* (Hertlein & Strong, 1951) and *S. stillmani*; the sister genus *Cleospira* contains only *C. ochsneri* (Hertlein & Strong, 1949). The western Atlantic species, listed in Malacolog (*fide* Maes), are *Strictispira acurugata* (Dall, 1890), *S. drangai* (Schwengel, 1951), *S. paxillus*, and *S. solida*, with *Drillia ebenina* as a synonym. The Recent material in the ANSP collection considered to be *S. acurugata* by Maes is here shown to be the new species *S. redferni*. *Drillia acurugata* is restricted to fossil forms only, and is herein considered a probable member of the cochlespirine genus *Pyrgospira*. With the addition of two new taxa, *Strictispira redferni* and *Strictispira coltrorum*, reassignment of *Crassispira quadrifasciata,* which has been determined to be strictispirid, *S. paxillus*, *S. solida,* and possibly *S. drangai,* the number of *Strictispira* species in the western Atlantic is tentatively six. No members of *Cleospira* are yet known in this area.

Fossil taxa considered to belong in the genus on the basis of shell morphology are: *S. acurugata* (Dall, 1890), from the Upper Pliocene-Lower Pleistocene Caloosahatchee Formation of Florida; *S. aurantia* (Olsson, 1922) from the Late Miocene Gatun formation in Costa Rica; *S. ebenina* (Dall, 1890) from Upper Pliocene-Lower Pleistocene Caloosahatchee Formation and from the Middle Pliocene Pinecrest Beds of Florida; *S. lomata* (Woodring, 1928) and *S. ponida* (Woodring, 1928), from the Upper Pliocene Bodwen Formation of Jamaica; *S. proebenina* (Gardner, 1937) from the Upper Middle Miocene Shoal River Formation of Florida – Maes ms notes; McLean (1971a: 125) included *ponida* and *lomata* on the basis of sinus structure – and *Clavus* (*Crassispira*) *zizyphus* Berry, 1940, from the Lower Pleistocene Hilltop Quary of San Pedro, California (pers. comm., McLean). As stated, *S. acurugata* and *S. ebenina* have been thought to be Recent as well as fossil, but are here considered fossil only and are further discussed below. Analysis of the other fossil taxa are outside the scope of this paper.

MATERIALS AND METHODS

Specimens of the genus *Strictispira*, some with soft parts, from various geographic localities, were examined as to shell morphology, and, where possible, as to anatomy, especially foregut and radular morphology. Photographs were made of representative shells. SEM

preparations were made of protoconchs, operacula, and, in one instance, of a radular ribbon. Preserved specimens were dissected; dry specimens were treated with KOH and dissected as possible. Drawings of individual teeth were made from radular preparations, which had been slide mounted and stained. Serial sections were made in one instance. Type material and voucher specimens were deposited at the USNM, MORG, and other institutions. Radular preparations were deposited at the USNM and the ANSP.

Institutional abbreviations used:

AMNH = American Museum of Natural History, New York, U.S.A.
ANSP = Academy of Natural Sciences, Philadelphia, U.S.A.
DMNH = Delaware Museum of Natural History, Wilmington, Delaware, U.S.A.
FMNH = Field Museum of Natural History, Chicago, Illinois, U.S.A.
LACM = Los Angeles County Museum of Natural History, Los Angeles, California, U.S.A.
MCZ = Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, U.S.A.
MNHN = Muséum National d'Histoire Naturelle, Paris, France
MORG = Museu Oceanografico do Rio Grande, Rio Grande, Brazil
NHM = The Natural History Museum, London, England
NM = Natal Museum, Pietermaritzburg, South Africa
USGS = United States Geological Survey, Washington, D.C., U.S.A.
USNM = National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A.

Other abbreviations:

spec. = specimen(s)
colln. = collection
Exp. = Expedition
Stn. = Station

SYSTEMATICS

Strictispiridae McLean, 1971
Genus *Strictispira* McLean, 1971
Type species: *Crassispira ericana* Hertlein & Strong, 1951

Description

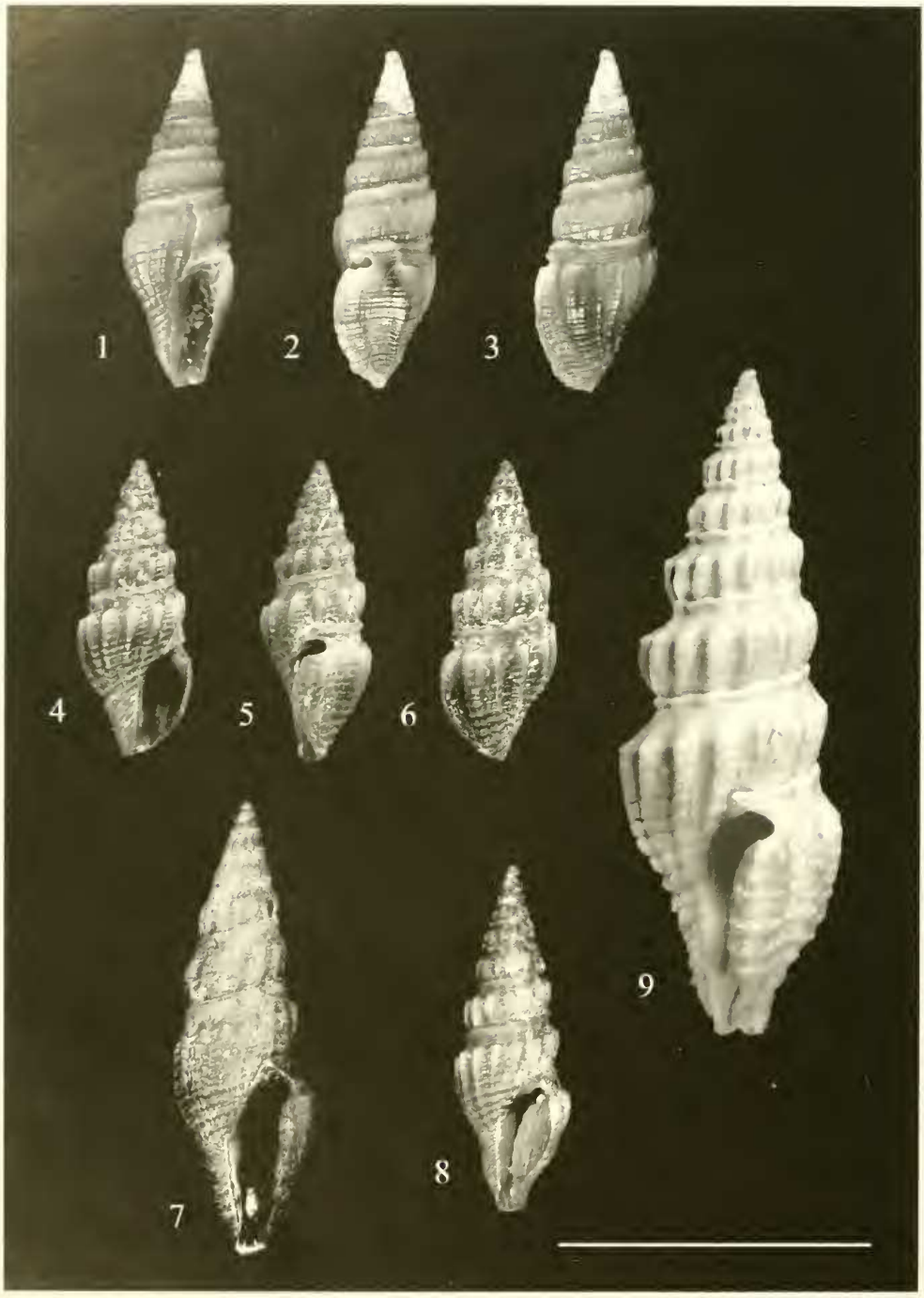
Shells of small size (approximately 10–25 mm), drilliiform, dark colored, sculptured with axial ribs and spiral cords or threads; concave sulcus with subsutural cord; laterally directed, U-shaped sinus with projecting parietal tubercle; protoconch smooth, of approximately two whorls; operculum ovoid, with terminal nucleus; animal with large radular ribbon bearing numerous rows of paired marginal teeth of pistol shape, with median flange; lacking poison apparatus.

Strictispira coltrorum, new species

Figures 1–3, 19, 25, 36

Description

Shell small (to approximately 11 mm), drilliiform, elongate, turreted, moderately high spired; body whorl about half shell length; anterior canal short, open, unnotched. Color medium brown overall to color form with variably lighter spiral banding of shell periphery, lighter outer lip and parietal tubercle. Protoconch (Fig. 19) of two smooth whorls, tip protruding; teleoconch 6–6½ whorls, moderately strong subsutural cord, occasionally lighter colored than rest of shell; shoulder sulcus sharply concave; shoulder tabulate; axial ribs, with blunt posterior ends, extending anteriorly, forming flat whorl profile to following whorl. Body whorl with flat peripheral region, ribs curving around moderately convex base, disappearing at moderately concave junction with canal. Suture rising slightly onto preceding whorl at end of body whorl. Ribs rounded, slightly less in width than interspaces, slightly opisthocline, 13–14 to varix on body whorl, 18–20 on penultimate whorl and spire whorls. Last rib enlarged to form modest varix ¼ whorl or less back from thin, curved lip edge. Occasional specimens with varix formed of two joined ribs. Spiral cords rounded, evenly spaced, 4–5 on spire whorls, not crossing ribs or doing so only faintly until below periphery, 6–7 forming slightly laterally elongate beads on crossing axials, beads becoming stronger anteriorly, 5–6 strong cords on canal. Moderately deep, U-shaped sinus on sulcus, apex at mid point, projecting parietal tubercle narrowing sinus entrance. Sinus tracks present on sulcus. Three distinct spiral threads always present on sulcus. Very shallow stromboid notch always present.



FIGS. 1–9. Shells of *Strictispira* spp. FIGS. 1–3: *Strictispira coltrorum*, holotype, MORG 43415, Escavalda Id., Guarapari, Espirito Santo, Brasil, 10.9 x 4.0 mm; FIGS. 4–6: *Strictispira redferni*, holotype, USNM 1010771, Abaco Id., Bahamas, 9.3 x 3.6 mm; FIG. 7: *Strictispira redferni* variety, ANSP 221823, Vaca Key, Florida Keys, 14.1 x 4.6 mm; FIG. 8: *Strictispira redferni* variety, ANSP 355797, Exuma, Bahamas, 10.9 x 4.0 mm; FIG. 9: *Drillia acurugata*, holotype, USNM 97320, Caloosahatchee Riv., Upper Pliocene, Florida. 21.0 x 7.8 mm. Scale bar = 10 mm.

Anatomy

One specimen containing dried animal with operculum available. Animal with foot, head and mantle/siphon mottled black. Foot elongate. Head small, with two tentacles bearing eyes distally and laterally. Large siphon on left continuous with thin mantle. Mantle edge behind tentacle bases dorsally, bearing sinus indentation on right. Mantle semitransparent; gills and osphradium visible on left and penis on right, originating behind right tentacle, reflected backwards under mantle. Foregut anatomy difficult to discern but showing large rhynchodeum and moderate sized proboscis, both with circular internal folding due to retraction. Structure of buccal tube and cavity could not be determined. Massive odontophore dominating body cavity. No poison gland or bulb present. No salivary gland seen. Odontophore of paired cartilages, strong subradular membrane and paired, marginal radular teeth present. Partial radular ribbon with approximately 80 pairs of teeth. Teeth (Fig. 36) approximately 190 µm, solid, pistol-shaped, with pointed anterior end and median flange. Operculum (Fig. 25) ovate, elongate, with pointed anterior end and terminal nucleus.

Type Material and Locality

Holotype, MORG 43415, Escavalda Id., Guarapari, Espirito Santo, Brasil (20°42'S, 40°25'W), dredged at 25–30 m, on bryozoans, Dec. 1993, A. Bodart!; paratypes, same data as holotype: 2 spec., USNM 1011351; 1 spec., USNM 1011352; 1 spec. each at AMNH, ANSP, DMNH, FMNH, LACM, MCZ, MNHN, MORG, NHM, NM (material *ex* author's colln.).

Distribution

Known only from the type locality.

Discussion

This is a very uniform group of shells, undoubtedly a population sample. One specimen has 4 fairly strong spiral lirae inside the outer lip extending back into the shell for about ¼ whorl.

Strictispira coltrorum is nearest *Strictispira redferni*, but is typically smaller (the holotype of *S. redferni*, selected because of its excellent condition, is smaller than the holotype of *S. coltrorum*). It is more elongate, has more and narrower axial ribs than *S. redferni*, has a stronger parietal tubercle of typical strictispirid form, different protoconch – two whorls, with protruding tip vs. 1½ whorls with a partially immersed tip in *S. redferni*, and different color – medium brown vs. black brown for *S. redferni*. The radular structure and radular teeth are essentially the same in both species.

Strictispira coltrorum is similar to *Crassiclava apicata* (Fig. 16) in shell morphology, differing by being smaller, having a strictispirid sinus, having more and closer ribs and more concave sulcus, different protoconch – two whorls with protruding laterally placed tip rather than 2–2½ whorls with flat lateral tip, and of different color-medium brown vs. dark brown.

Etymology

The species is named after José and Marcus Coltro for their kind donation of specimens and their contributions to malacology.

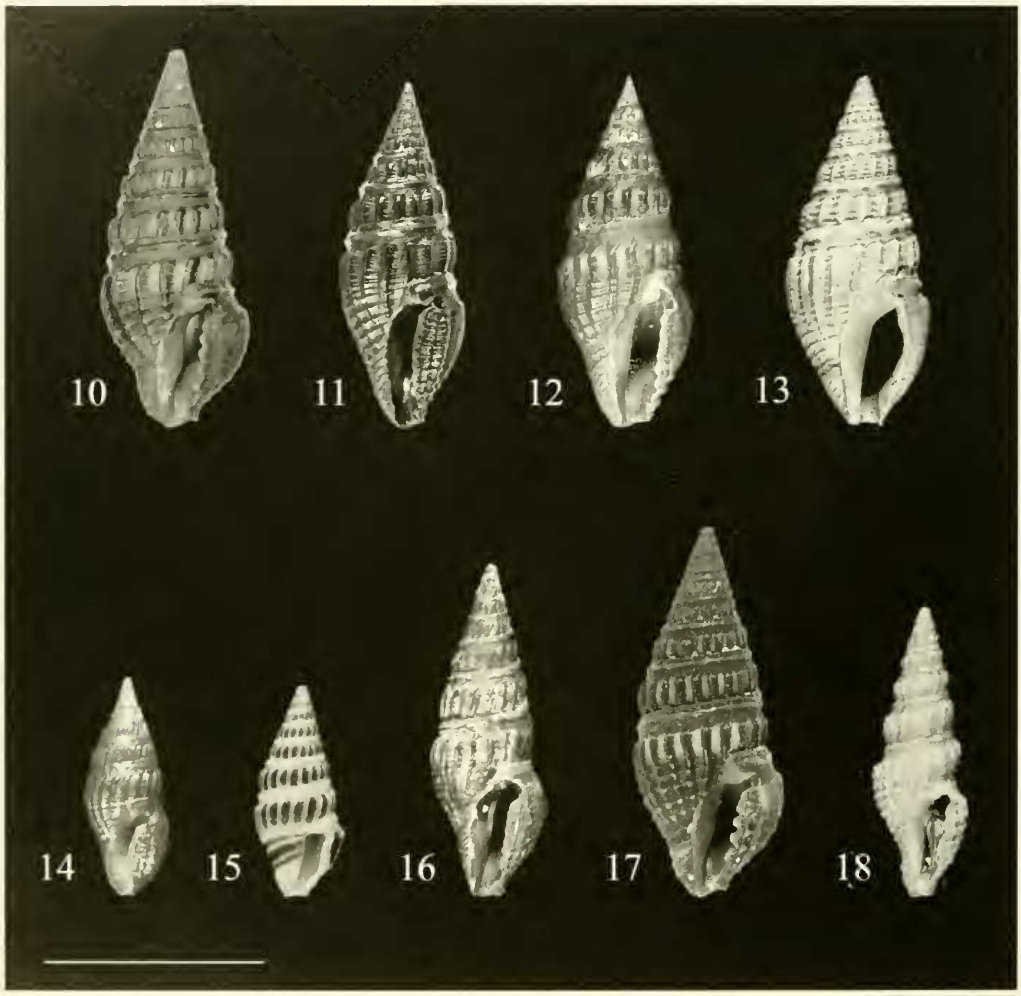
Strictispira drangai (Schwengel, 1951)
Figures 10, 20, 26

Crassispira drangai Schwengel, 1951: 116, pl. 8, fig. 1.
Crassispira (*Crassispirella*) *drangai* (Schwengel, 1951) – Abbott, 1974: 273, species 3056, list ("Very close to *Clathrodrillia solida* C. B. Adams."); Redfern, 2001: 125, species 519, pl. 56.
Strictispira drangai (Schwengel, 1951) – Malacolog, 2004, list.

Description

Shell fusiform, turreted, moderately tall spired, spire angle 32°, length to approximately 25 mm; body whorl somewhat truncate anteriorly, slight basal constriction. Protoconch (Fig. 20) of two smooth, brown whorls; teleoconch approximately 8 whorls. Whorl outline flattish below sulcus. Sulcus narrow, concave, bearing fine spiral striae and curved sinus traces, preceded by strong, sharply crested subsutural cord somewhat distant from suture. Sculpture of narrow axial ribs, 17–22 on penultimate whorl, producing whorl shoulder, interspaces wider, disappearing at bottom of base. Four or five regularly spaced, widely separated spiral cords, crossing axials weakly on periphery, 4–6 more prominent, basal cords below periphery, producing beading on crossing axials, 5–6 cords down

canal. Fine secondary spiral threads between primaries overall. Sculpture forms pattern of rectangular spaces with enclosed spiral threads. Enlarged axial or two forming varix behind outer lip. Aperture parallel-sided, ending in short, open, slightly notched anterior canal bent slightly right. Small stromboid notch. Lip edge fluted. Columellar callus thin, emarginate. Sinus deep, U-shaped, with moderately projecting parietal tubercle, most specimens with vertical groove behind distal end of tubercle (see Discussion below). Color shiny dark brown when fresh, rib interspaces usually lighter colored, especially on body. Operculum (Fig. 26) ovoid, with pointed anterior end and terminal nucleus.



FIGS. 10–18. Shells of *Strictispira, Crassispira, Drillia, Crassiclava, Crassispirella, Pyrgospira* spp. FIG. 10: *Strictispira drangai*, holotype, ANSP 247104, Hastings, Barbados, 17.7 x 6.7 mm; FIG. 11: *Strictispira solida*, USNM 900424, Key West, 16.0 x 5.9 mm; FIG. 12: *Crassispira* sp., ANSP 368728, Bahamas, 16.0 x 6.4 mm; FIG. 13: *Drillia ebenina*, figured syntype, USNM 97318, Caloosahatchee Riv., Florida, Upper Pliocene, 16.5 x 7.0 mm; FIG. 14: *Strictispira paxillus*, specimen figured by Maes (1983: fig. 10), ANSP 342987, White Bay, Guana Id., British Virgin Ids., 10.0 x 4.4 mm; FIG. 15: *Strictispira quadrifasciata*, USNM 902242, Jamaica, 9.6 x 3.9 mm; FIG. 16: *Crassiclava apicata*, specimen illustrated by Maes (1983: fig. 15), ANSP 355011, White Bay, Guana Id., British Virgin Ids., 15.8 x 5.6 mm; FIG. 17: *Crassispirella fuscescens*, USNM 900978, off Stiltsville, Miami, Florida, 16.9 x 6.9 mm; FIG. 18: *Pyrgospira ostrearum*, specimen illustrated by Tryon (1884, pl. 34, fig. 79), ANSP 15470, Boca Ciega Bay, Florida, 13.4 x 4.9 mm. Scale bar = 10 mm.

Type Material and Locality

Holotype, ANSP 247104, Hastings, Barbados, T. Dranga!, 1950, *ex* Schwengel colln. Shell length 17.7 mm, not 12.5 mm, as stated by Schwengel. Measurements: 17.7 x 6.7 x 9.3 (body whorl length) x 5.8 (aperture length) mm.

Distribution

West Florida (site not given), off Miami, Bahamas, Greater Antilles, St. Thomas, Barbados.

Material Examined

ANSP: holotype, 247104, Barbados; 1 spec., 355567, Grand Bahama Id., 26°38'N, 78°25'W, J. Worsfold!, *ex* Worsfold colln.; 1 spec., 298408, reef, NE of North Point, Elbow (Little Guana) Cay, Abaco, Bahama Ids., 7 ft (2 m), under dead *Acropora palmata*, R. Robertson!, 4 Aug. 1953; 1 spec., 193696, off Miami, 27 fms (48 m), rocky, T. L. Moise!, 30 Apr. 1954; 1 spec., 62760, W. Florida, C. W. Johnson!, 1890; 1 spec., 374474, Grand Bahama Id., 26°31'N, 78°46'30"W, J. Worsfold!, *ex* Worsfold colln.

USNM: 1 spec., 64398, Jamaica; 1 spec., 102967a, St. Thomas; 1 spec., 411904, Ensenada de Cochinos, Cuba, J. B. Henderson!; 1 spec., 411908, Cochinos Bay, Cuba, rocky shore, J. B. Henderson!; 1 spec., 900980, Egmont Key, Florida, Gulf of Mexico, 45 ft (13.5 m), P. Williams!, 25 May 1985; 1 spec., 1023063, shoreline NW of Thurstone Bay, Abaco, Bahamas, 26°43'03"N, 77°19'85"W, live collected from underside of rock, 0.5 m, 1 July 1997, C. Redfern!, *ex* Redfern colln. (last two lots *ex* author's colln.).

Discussion

Crassispira drangai was included as a member of the genus *Strictispira* by Maes on the basis of shell morphology, a reasonable location in view of its similarity to *Strictispira solida*, but questionable on the basis of the parietal tubercle, which is crassispirine. A preserved specimen (USNM 1023063, 15.0 x 6.2 mm), that figured by Redfern (2001), and the source of the protoconch and operculum figures here shown, was kindly made available by that author. However, although some animal features could be discerned, a radula was not retrieved. Therefore, the current assignment is tentative, based on shell morphology, and definitive generic assignment must await anatomical study.

Shells of *S. solida* and *S. drangai* are very similar, differing chiefly on the basis of one character, the pattern formed by the peripheral spiral cord structure. In *S. solida* (Fig. 11), there is a variable number of regularly spaced cords, crossing the ribs as well as between them, with no formation of rectangular spaces. In *S. drangai* (Fig. 10), the primary spirals are fewer, narrower, and more widely spaced, and rectangular spaces are produced between them and the axials. Three or four fine secondary spiral threads are present between the primary spiral cords. This formation is absent in *S. solida*. Schwengel noted the fewer spirals on *S. drangai*, with finer secondary spiral threads in the interspaces. On the shell base, there are variably rectangular to square spaces formed in both species, this not being a differentiating feature. All other shell characters are variably present in both *S. drangai* and *S. solida*. *Strictispira drangai* is generally larger, M = 18.2 mm in length for *S. drangai*, 14.8 mm for *S. solida*, and the body whorl/shell length ratio is smaller for *S. drangai*, 46% vs. 61% for *S. solida*. Overlapping is present though for both measurements. When fresh, *S. solida* has a black shell; *S. drangai* is very dark brown. The lighter intercostal coloring is applicable to both species and is not a differentiating character.

Crassispirella fuscescens (Reeve, 1843) (Fig. 17) is perhaps more likely confused with *S. drangai*, being quite similar to it. It differs in having a stubbier shell, with less basal constriction, and a slightly larger body whorl (56% vs. 51%). The sulcus is less concave. There are more axial ribs with more prominent beading on the basal segment. The peripheral sculpture pattern is less prominent in *C. fuscescens* because the spirals are closer together, but is essentially the same as in *S. drangai*. The axial interspaces are always of lighter color in *C. fuscescens*, although faint in some specimens. It may be absent in *drangai*. Kaicher (1984: card 3906) figured the illustrated syntype of *C. fuscescens*, a worn, faded shell, but the peripheral sculpture is evident in this photo, a hand lens being necessary to see the fine threads. De Jong & Coomans (1988: 109, species 582, pl. 43) report specimens of *C. fuscescens* from Curaçao, reaching 24 mm. Their illustration is excellent.

A lot in the ANSP (368728, 13 specimens, including 4 preserved, from the Bahamas) that had been considered to be *S. solida*, although

closer to *S. drangai*, turns out to be a *Crassispira* (Fig. 12); anatomical study of the preserved specimens revealed a radula of the duplex type similar to that of *Crassispira* (Kantor et al., 1997). The shell has a moderately extended canal and a general form similar to *Crassiclava apicata*. There is a vertical groove behind the forefront of the parietal tubercle, as seen in *Crassispira*, therefore assignment to *Crassispira* is likely. The shells share the rectangular peripheral sculptural pattern of *S. drangai* and *C. fuscescens*, differentiation being based on the shell form and extended canal. This form is apparently undescribed. It is not further considered here, rather being included for differentiation from the present taxa.

Etymology

Named after Mr. Ted Dranga, the discoverer of the type specimen.

Strictispira paxillus (Reeve, 1845)
Figures 14, 21, 27, 37

Pleurotoma paxillus Reeve, 1845: pl. 31, species 285.

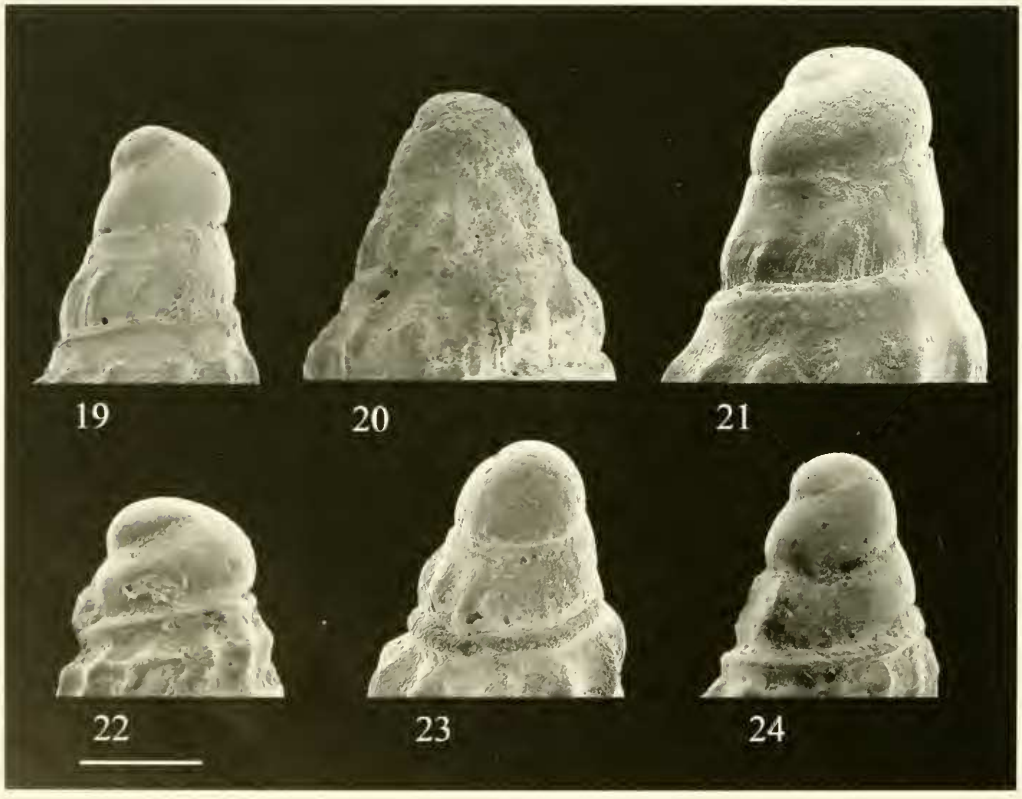
Drillia (*Crassispira*) *paxillus* (Reeve, 1845) – Tryon, 1884: 194, pl. 14, fig. 92 [repetition of Reeve's fig.].

Crassispira paxillus (Reeve, 1845) – de Jong & Coomans, 1988: 109, species 581, description and figure.

Strictispira paxillus (Reeve, 1845) – Maes, 1983: 318, figs. 10, 21, 29, 43, 47; Redfern, 2001: 127, species 526, pl. 57; Malacolog, 2004, list.

Clathrodrillia solida (C. B. Adams, 1830 [sic]) – Rios, 1975: 130, pl., 39, fig. 583 [a misidentification, *fide* Maes, 1983: 318, "The Brasilian shell figured is *S. paxillus*"].

Pleurotoma nigrescens Reeve, 1845, *ex* Gray MS: pl. 26, species 235.



FIGS. 19–24. Protoconchs of *Strictispira* spp. FIG. 19: *Strictispira coltrorum*, USNM 1011352; FIG. 20: *Strictispira drangai*, USNM 1023063; FIG. 21: *Strictipira paxillus*, specimen, one of two, juvenile, shell 7.1 x 3.3 mm, Redfern colln.; FIG. 22: *Strictispira quadrifasciata*, USNM 902243; FIG. 23: *Strictispira redferni*, USNM 1010773; FIG. 24: *Strictispira solida*, USNM 900428. Scale bar = 0.5 mm.

Pleurotoma jamaicensis Guppy, 1866: 290, pl. 16, fig. 6.

Drillia jamaicensis (Guppy) – Pilsbry, 1922: 320, list and text [synonymized *Drillia ebenina* Dall, 1890].

Material Examined

2 spec., one mature, one juvenile, Chub Rocks, Abaco, Bahamas, live collected on underside of rocks, 9 m, C. Redfern!, 10 Oct., 1982, Redfern colln.

ANSP: 1 spec., 342987, White Bay, Guana Id., British Virgin Ids., 2–3 m, in drifted sand on rocks, V. O. Maes!, 15–28 Feb., 1975 (specimen in Maes, 1983: fig.1); 1 spec., 15317, no locality data, *ex* R. Swift colln.; 3 spec., 15487, "St. Thomas, W. I. (Krebs)" R. Swift; 1 spec., 249182, Jack Bay, Anegada, Virgin Ids., 0–8 ft (0–2.4 m), sand, stones, coral, Stn. 770, A. J. & J. C. Ostheimer!, 18 Mr., 1960; 1 spec., 249316, 0.25 to 2 mi. SE of East Point, Anegada, Virgin Ids., 6–20 ft (1.8–6 m), mostly sand, Stn. 774, A. J. & J. C. Ostheimer!, 20 Mr., 1960; 1 spec., 313121, Guantanamo Bay, Cuba, outer beaches, R. T. & S. Abbott!, May 1967; 1 spec., 331166, 0.5–1 mi. SSW of The Bluff, Beef Id., British Virgin Ids., 12–14 fms (21.6–25.2 m), R. Robertson!, 11 Dec. 1973; 4 spec., 350580, Reef south of Bellamy Cay, Trellis Bay, Beef Id., British Virgin Ids., 1–5 m, R. Robertson & V. O. Maes!, 16–21 Feb. 1973; 1 spec., 350784, Pointe des Chateaux, Grande Terre Id., Guadeloupe, R. A. & V. O. Maes!, Feb. 1967; 1 spec., 355363, Enmedio Reef, Vera Cruz, Mexico, J. W. Tunell!, 17 June 1973; 1 spec., 355364, Isla de Lobos Reef, Vera Cruz, Mexico, J. W. Tunell!, 9 June 1973.

Paleontological colln.: 6 spec., ANSP 3773, Jamaica, H. Vendryes!, *ex* Guppy colln.

USNM: 2 spec., 161147, Mayaguez Harbor, Puerto Rico, U.S. Fish Comm.; 1 spec., 502569, off Falmouth, Antigua, beach, University of Illinois Exp., J. B. Henderson!, 1918; 1 spec., 702318, Van Thiel, Curaçao, 10 ft (3 m), underside of rocks at low tide, *ex* Mrs. D. Meyer colln., 20 Jan. 1981; 2 spec., 900416, Curtain Bluff, Antigua and Barbuda, 5–15 ft (1.5–4.5 m), Sept. 1981; 2 spec., 900417, Curtain Bluff, Antigua and Barbuda, 20 ft (6 m), S. Jazwinski!; 2 spec., 900418, Samana, Las Galeras, Dominican Republic, 4–7 ft (1.2–2 m), G. Duffy!, Aug. 1994; 2 spec., 900419, Cabo Rojo, Bahia Salinas, Puerto Rico, 18 ft (5.5 m), night collected, G. Duffy!,18 May 1996 (last four lots *ex* author's colln.).

Distribution

Guantanamo, Cuba, east to Dominican Republic, Puerto Rico, Virgin Ids., Guadeloupe in Leeward Ids.; Mexico, Atlantic coast of Costa Rica (Robinson & Montoya, 1987: 391, list); Curaçao, Aruba, Bonaire area (de Jong & Coomans, 1988: 109); Brazil (Rios, 1975: 130, 583, pl. 39, as *Clathrodrillia solida, fide* Maes, 1983: 318); Colombia (Diaz & Puyana, 1994: 222, 875, description and fig., as *Crassispira* (*Strictispira*) *paxillus*).

Description

Shell broadly biconic fusiform, spire angle 39°, length to approximately 10 mm (reported to 15 mm by de Jong & Coomans, 1988: 109); spire outline slightly concave; body whorl large, truncate anteriorly with little basal constriction; anterior canal absent. Protoconch (Fig. 21) of two smooth whorls, teleoconch approximately seven whorls. Whorls slightly rounded below sulcus on later whorls. Subsutural sulcus flattish, subsutural cord projecting little, finely doubled. Sculpture of approximately 20 slightly opisthocline axial ribs on body whorl, forming a shoulder below sulcus, fading at base, and evenly spaced spiral threads between axials, becoming stronger and crossing axials with beading below shell periphery. Fine spirals and curved sinus traces on sulcus. Varix behind outer lip. No stromboid notch. Sinus U-shaped, deep, with protruding parietal tubercle somewhat constricting sinus entrance. Color uniformly shiny black to dark brown, with rib interspaces same color in fresh shells.

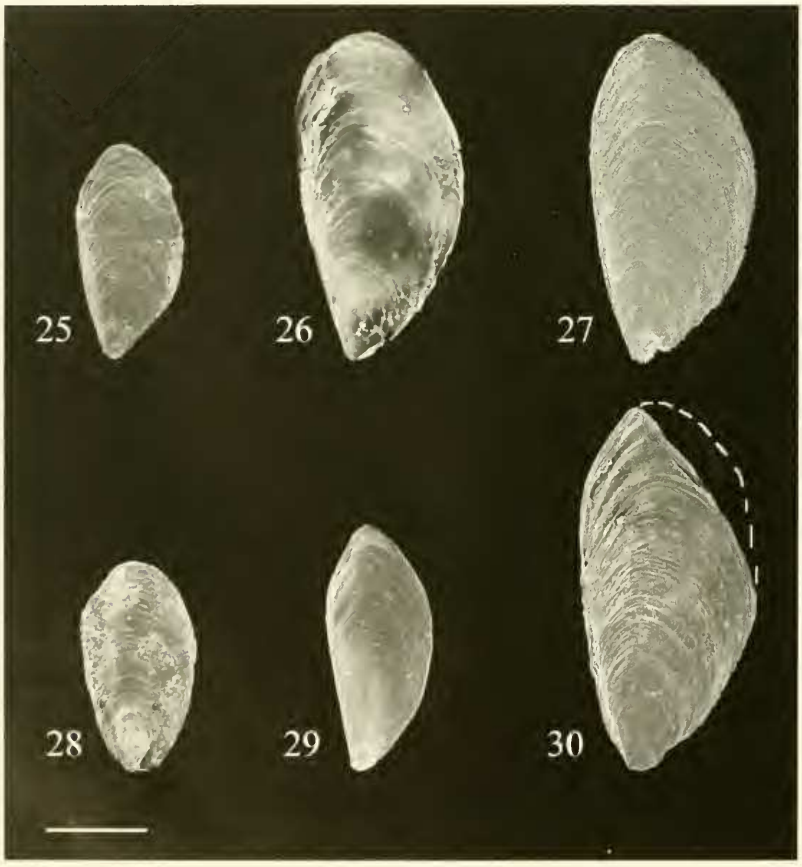
Animal, according to Maes, with head and foot similar to crassispirines, covered with sooty blotches, with a muscular foregut, lacking a poison apparatus, and with characteristic radular teeth that protrude "from the buccal mass-like a pair of ice-tongs". Radular teeth (Fig. 37) pistol-shaped, slender for genus, with flange slightly posterior from midpoint. Operculum (Fig. 27) semitransparent, reddish-orange, ovoid, with pointed anterior end and terminal nucleus.

Discussion

Described from an unknown locality, *Strictispira paxillus* was not identified as western Atlantic until Maes's work, although Tryon had thought that it was in all likelihood a synonym of the western Atlantic *Drillia* (*Crassispira*) *fuscescens* (Reeve, 1843). Maes

examined Reeve's NHM *paxillus* material. On the type label, "West Indies" had been written in. She recognized it as the same as certain western Atlantic specimens, these therefore being *paxillus*. A note with *S. paxillus* ANSP 15317 states, "agrees with type BM. V. O. M. 7/3/68". Identified as "*D.* (*Drillia*) *paxillus*", Maes had penciled over this "*Crassispira*", showing she was not thinking of *Strictispira* at that time. Her later Guana Id. anatomical material clearly identified the species as strictispirid. It is worth noting how similar Reeve's excellent illustration of the species is to *S. paxillus* specimens in the USNM and ANSP collections, including Maes' Guana Id. material.

Maes (1983: 318f) described *S. paxillus* briefly, figured it, including the shell, protoconch, and a radular section, plus foregut anatomy, stomach and male reproductive system, reference to which is here made for details. She considered *Pleurotoma nigrescens* Reeve, 1845, and *P. jamaicensis* Guppy, 1866, the latter from the Upper Pliocene of Jamaica, as synonyms, these both being high-spired forms. Pilsbry (1922) discussed *Drillia jamaicensis* from the Guppy collection at the ANSP, and these six specimens were examined (Paleo, colln. 3773). They are clearly *S. paxillus*. The illustrated specimen from Maes (1983) is shown in Figure 14. Maes pointed out that there are a number of species of similar general appearance, both within the strictispirids, as well as in other families, such as *Crassispirella fuscescens* and *Crassiclava apicata*. Thus, literature records are not reliable unless voucher material is available.



FIGS. 25–30. Opercula of *Strictispira* spp. FIG. 25: *Strictispira coltrorum*, USNM 1011351; FIG. 26: *Strictispira drangai*, USNM 1023063; FIG. 27: *Strictispira paxillus*, as with Fig. 21; Fig. 28: *Strictispira quadrifasciata*, USNM 902243; FIG. 29: *Strictispira redferni*, USNM 1010775; FIG. 30: *Strictispira solida*, USNM 411922. Scale bar = 1.0 mm.

Differentiation from other species, as she points out, is based on the broad shell, flat sulcus, and numerous ribs in *paxillus*. Additionally, the slightly concave spire outline, absence or near absence of an anterior canal, flat basal profile, and doubled subsutural cord are characteristic. The radula readily distinguishes *S. paxillus*, and other strictispirids, from similar species in other genera, such as *Crassispirella fuscescens* (Fig. 17) and *Crassiclava apicata* (Fig. 16).

Distinguishing shell features include larger size for both *C. fuscescens* and *C. apicata*. *Crassispirella fuscescens* has a sculptural pattern on the shell periphery of rectangular spaces, as described above with *S. drangai*, stronger beading on the base, and lighter color between the axials. *Crassiclava apicata* has a narrower shell with a higher spire, longer anterior canal with stronger basal constriction, and axial ribs curving onto preceding sulcus. For differentiation from other strictispirids, see following.

Strictispira quadrifasciata (Reeve, 1845)
Figures 15, 22, 28, 38

Pleurotoma quadrifasciata Reeve, 1845, pl. 28, species 251.

Drillia (*Crassispira*) *quadrifasciata* (Reeve, 1845) – Tryon, 1884: 195, pl. 14, fig. 82 [repeat of Reeve's fig.].

Crassispira quadrifasciata (Reeve, 1845) – Kaicher, 1984: card 3896; Leal, 1991: 189, pl. 24, fig. G.; Rosenberg, 1992: 105, illustrated; Malacolog, 2004, list.

Crassispira (*Crassispirella*) *quadrifasciata* (Reeve, 1845) – Humfrey, 1975: 183, pl. 22, fig. 12.

Material Examined

1 spec., Curtain Bluff, Antigua, 5–15 ft (1.5–4.5 m), Sept. 1981, sacrificed to obtain radula.

USNM: 1 spec., 19046, no locality, U.S. Exploring Exp.; 1 spec., 86869, Samana Beach, Santo Domingo, 16 fms (29 m), Blake Exp.; 1 spec., 367064, no locality, *ex* T. L. Casey colln.; 1 spec., 502561, Pelican Id., Barbados, shallow, on coral, Southern University of Illinois Exp., 1918; 20 spec., 598487, E side Buccoo Reef, Tobago, R. W. Foster!, Apr. 1951; 2 spec., 682194, Buccoo Reef, Tobago, Smithsonian Bredin (SBI) Exp., Stn. 8, 5 Apr. 1959, 9:30 AM–12:30 PM; 25 spec., 682219, Buccoo Reef, Tobago, SBI Exp. Stn. 15, middle portion of reef, off high ground, dry at low tide, 6 Apr. 1959, 7–9 AM; 10 spec., 682294, Buccoo Reef, Tobago, SBI Exp. Stn. 26, shallow, 9 Apr. 1959; 1 spec., 682318, Buccoo Reef, Tobago; 6 spec., 902240, Curtain Bluff, Antigua, 5–15 ft (1.5–4.5 m), Sept. 1981; 1 spec., 902241, off Cat Id., Bahamas, 3–6 ft (0.5–1.8 m); 1 spec., 902242, between Montega Bay and Tryall, Jamaica, 20–40 ft (6–12 m), Dec. 1989; 2 spec., 902243, south coast of Dominican Republic, 1–3 m, G. Duffy!; 1 spec., 902244, Roatan Id., Honduras, 10 ft (3 m), P. Williams!, 1985 (last five lots *ex* author's colln.).

ANSP: 8 spec., 195808, Buccoo Reef, Tobago, label reads "compared with type in BM, V. O. M., 4 July 1968"; 1 spec., 240097, off Morro de Pto. Moreno, Isla de Margarita, Venezuela, 4–50 ft (1.2–15 m), W. M. Hellman!, 4 Feb. 1959, Stn. 21; 1 spec., 291178, 1 mi. N of Holetown, Barbados, 3–20 ft (1–6 m), reef and sand, R. & V. O. Maes!, Dec. 1963 (figured in *Encyclopedia of Seashells*, G. Rosenberg, 1992: 105); 1 spec., 300152, Genipabú, Natal, Rio Grande do Norte, Brazil, dry to 3 ft (to 1 m), sand, rock outcrop, grass, G. & M. Kline!, 3 Dec. 1963, Stn. 582; 2 spec., 313113, outer beaches, Guantanamo Bay, Cuba, R. T. & S. Abbott!, May 1967; 10 spec., 1 mi. N of Pointe des Chateaux, Guadeloupe, 3–10 ft (1–3 m), weed on coral rock, V. O. Maes!, live animal photographed; 1 spec., 351090, Kralendijk, Bonaire, 12°09'N, 68°18'W, 25 Feb. 1970.

Distribution

Bahamas, Greater Antilles, Lesser Antilles, Tobago, Venezuela, Brazil, Honduras.

Description

Shell small (to approximately 12 mm), elongate-biconic, turreted, gradually narrowing below periphery with little basal constriction to truncate, open, anterior canal. Body whorl half shell length. Prominent subsutural cord, narrow, concave shoulder sulcus. Protoconch (Fig. 22) shiny chestnut colored, low and squat, 1½ smooth whorls, followed by ¼ whorl with quickly enlarging axial riblets blending into adult sculpture. Teleoconch whorls 5½–7. Numerous (approximately 20 on penultimate whorl, 15 to varix on body whorl), rounded, narrow, straight, slightly opisthocline axial ribs with wider interspaces, extending from bottom of sulcus to following suture on spire and, of

decreasing strength below periphery on body whorl, to junction with anterior canal. Regularly spaced spiral cords, 3–4, weak on spire, stronger on later whorls. On body whorl a fifth below periphery, followed by 2–3 more; on anterior canal, 4–5 more or less "packed", close-set, strong cords, appearing set-off from sculpture above. Beads formed on spirals crossing ribs. Fine secondary spiral threads overall. Aperture ovoid with U-shaped sinus at upper end and projecting parietal tubercle that may narrow entrance to sinus. Low tooth-like swelling may be present below sinus inside outer lip. Varix of one or two enlarged ribs behind outer lip. Shallow stromboid notch in some specimens. Distinctive color pattern, white base, variable chestnut banding, typically producing prominent white banding on sulcus, on fifth spiral cord region below periphery, the anterior canal tip, and on the beads on ribs or entire rib white. Some material with no white on sulcus or on beads. Variable pattern down shell base.

Radular teeth (Fig. 38) pistol-shaped marginals, approximately 180 µm, pointed anterior end, flange about $^1/_3$ forward from spatulate posterior end. Thirty-five pairs of teeth on fragmented radula sections on slide. Operculum (Fig. 28) amber, roundly ovoid with moderately pointed anterior end and terminal nucleus.

Discussion

Shells rather uniform in appearance, differing mainly in color patterning as noted, otherwise occasional specimens lack defined primary spirals on the shell periphery. It is not likely to be confused with any other species.

Conventionally considered crassispirine, availability of a specimen with the soft parts permitted radular study showing that *S. quadrifasciata* is strictispirid, the teeth being characteristic of the family. Whereas the other members of the genus are all somewhat similar in appearance, this species has pronounced color patterning, plus a protoconch and an operculum that differs significantly from the others – protoconch squat with axial riblets terminally, operculum broader with anterior end broad and rounded rather than pointed. Yet there is no difference in radular tooth structure from other strictispirids. I considered proposing a new genus for this species, but a conservative position seems best, assigning it to *Strictispira* pending study of further material.

Strictispira redferni, new species

Figures 4–8, 23, 29, 31–35

Strictispira sp. – Redfern, 2001: 127, species 528, pl. 57.

Strictispira acurugata (Dall, 1890) – Malacolog, 2004, list.

Description

(Based on type material, except shell length, which includes all material examined.) Shell small (to approximately 17.5 mm), drilliiform, turreted, body whorl about 60% shell length, anterior canal short, open, unnotched. Color light chestnut, fading to medium brown in beach specimens (the majority of the material), axial ribs slightly lighter at upper ends. Protoconch (Fig. 23) 1½ smooth whorls with partially immersed tip, 6–6¾ teleoconch whorls with moderately strong subsutural cord, which is occasionally somewhat darker than rest of shell, followed by strongly concave shoulder sulcus, shoulder tabulate, axial ribs to following suture forming flat whorl profile. On body whorl, after flat peripheral region, ribs curving around moderately convex base and end at moderately concave junction with canal. Ribs blunt posteriorly, rounded, slightly opisthocline, of equal width to interspaces, 9–13 to varix on body whorl, 12–15 on penultimate whorl. Last rib or two enlarged forming moderate-sized varix ¼ whorl back from thin, curved lip edge. Spiral cords rounded, evenly spaced, 5–7 on spire whorls, not crossing ribs until below periphery, 5–9 across base, and 5–7 strong cords on canal. Slightly laterally elongate beads on spirals crossing basal axials, becoming stronger anteriorly. Moderately deep U-shaped sinus on sulcus, apex at mid point, upper edge forming slightly projecting parietal tubercle on joining body whorl. Sinus tracks present on sulcus. Spiral threads 3–5 on sulcus, always present but varying from moderately strong to faint. Occasional fine spiral lirae extending somewhat back into shell below sinus inside outer lip. No stromboid notch, except slight curvature occasionally on mature specimens.

Anatomy

Animal whitish overall or with black mottled foot, head, and mantle/siphon complex. Foot elongate. Head small, bearing two tentacles with eyes distally and laterally. Mantle edge behind tentacle bases dorsally, bearing sinus indentation on right. Mantle thin, semitrans-

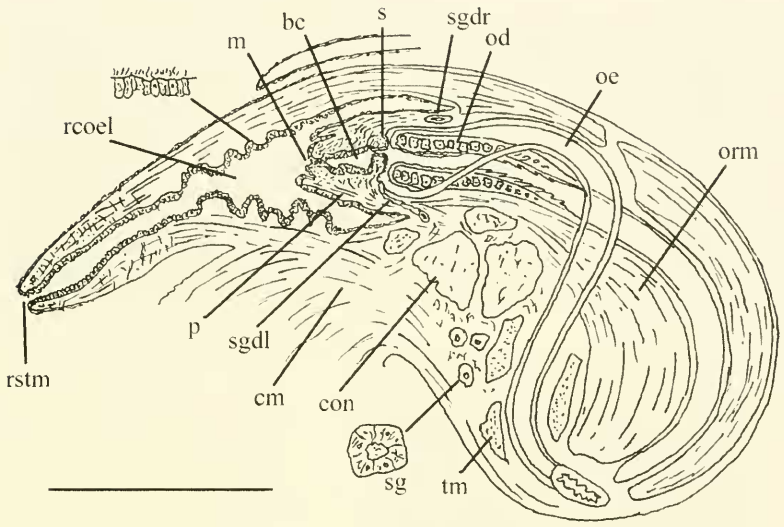
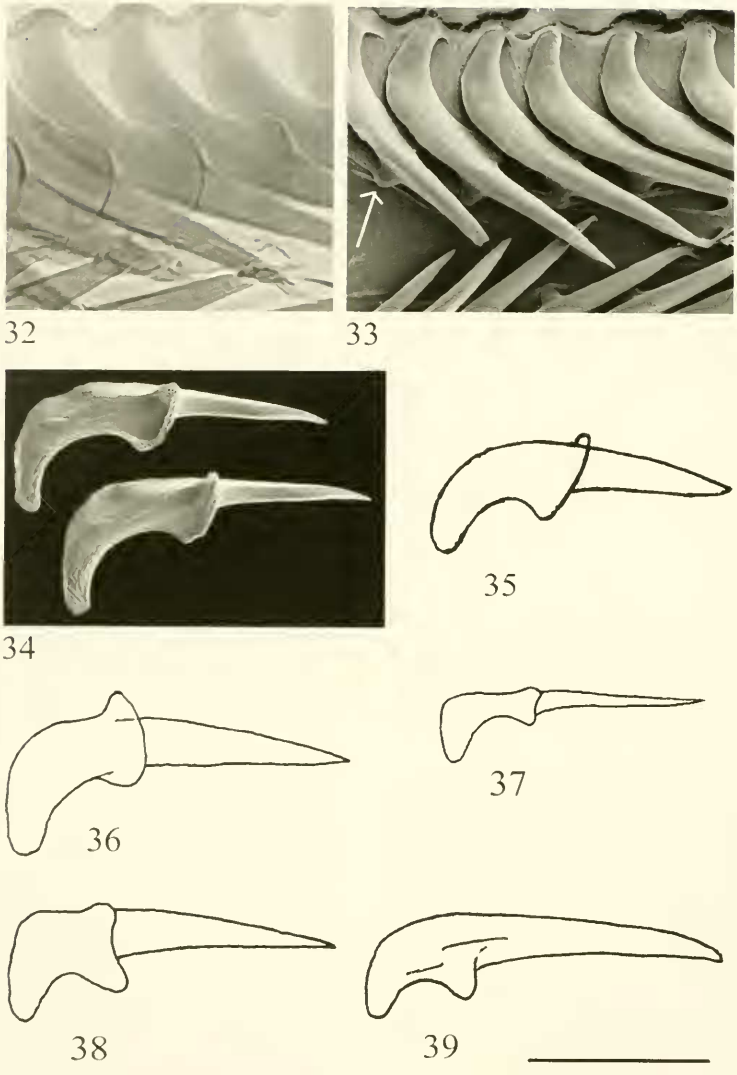


FIG. 31. *Strictispira redferni*. Semidiagrammatic sagital section of head and foregut, from serial section. Shell 10.1 x 3.8 mm, sacrificed: bc = buccal cavity, cm = columellar muscle, con = circumoral nerve ring, m = mouth, od = odontophore, oe = oesophagus, orm = odontophoral/radular retractor muscle, p = proboscis, rcoel = rhynchocoel, rstm = rhynchostome, s = buccal septum, sg = salivary gland, sgdl = left salivary gland duct, sgdr = right salivary gland duct, tm = transverse muscle bundle. Scale bar = 1mm.

parent, gills and osphradium visible on left and penis on right, originating behind and lateral to right cephalic tentacle, reflected backwards beneath mantle in male. Foregut anatomy (Fig. 31) showing rhynchostome medial, just below tentacle bases. Rhynchodeum large, with walls compressed longitudinally from retraction, producing strong circular, folding interiorly. Heavy longitudinal musculature throughout length, continuous with columellar muscle ventrally and extending posteriorly in body cavity. Radial and circular musculature interspersed in rhynchodeal walls, especially anteriorly, but no distinct rhynchostomal sphincter. High columnar rhynchodeal epithelium becoming flat cuboidal posteriorly. Moderately sized, muscular proboscis with strong folding due to retraction and with circular fold around mouth opening. Mouth opening into short buccal tube, which enlarges rapidly forming buccal cavity demarcated posteriorly from opening to oesophagus by muscular septum. Epithelium of proboscis same as rhynchodeal. Massive odontophore and radular structure dominating body cavity. Radula opening into proximal oesophagus, curving from ventrally and right. Strong radular membrane with doubled odontophoral cartilages curve posteriorly through body cavity. Radula of approximately 120 pairs of solid, pistol-shaped, pointed marginal teeth with median flange, measuring approximately 200 µm (Figs. 34, 35). Radular and odontophoral muscle heavy, extending posteriorly, joining with rhynchodeal, proboscis, and columellar muscle, interspersed with prominent transverse muscle bundles. Coiled salivary gland composed of single layer of ciliated cuboidal cells ventral to anterior odontophore and oesophagus, splitting into two ducts, left curving around oesophagus and opening into oesophagus just posterior to buccal septum. Right duct termination not seen due to slide defect. Poison gland or bulb absent. Oesophagus circular initially, becoming flattened due to compression between bundles of circumoral nerve ring (not shown in figure), lined by single layer of ciliated cuboidal cells. Operculum (Fig. 29) ovate, elongate, with flat columellar side, narrowed anteriorly and pointed, with terminal nucleus.

Type Material & Locality

Holotype, USNM 1010771, lee side of Guana Cay, Abaco Id., Bahamas (26°41'50"N, 77°9'35"W), dredged live, 12 ft (3.6 m), 9 July



FIGS. 32–39. Radular ribbons and teeth of *Strictispira* spp. FIG. 32: *Strictispira redferni*, USNM 1010773, slide preparation, light-transmitted, ribbon section; FIG. 33: *Strictispira redferni*, USNM 1010775, SEM preparation, ribbon section; FIG. 34: *Strictispira redferni*, USNM 1010775, SEM preparation, radular teeth, ventral view; FIG. 35: *Strictispira redferni*, ANSP A9421, Tavernier Key, Florida Keys; FIG. 36: *Strictispira coltrorum*, USNM 1011351; FIG. 37: *Strictispira paxillus*, drawing of tooth from Kantor & Taylor (1994: fig. 2C, using Maes's material), data as with Fig.14; FIG. 38: *Strictispira quadrifasciata*, Antigua, shell 7.9 x 4.1 mm, sacrificed; FIG. 39: *Strictispira solida*, USNM 411922. Scale bar = approximately 50 µm (Fig. 32), 100 µm (Figs. 33–39).

1994, C. Redfern!; paratypes: 38 spec., USNM 1010772, sandbank, lee side Guana Cay, Abaco, Bahamas, 9 July 1992, C. Redfern!, and 11 spec., USNM 1010773, spoil bank, Guana Cay, Abaco, Bahamas, 14 Aug. 1989, C. Redfern!; 1 spec., with data as per 1010772, at each of the following: AMNH, ANSP, DMNH, FMNH, LACM, MCZ, MNHN, MORG, NHM, NM (material *ex* author's colln.).

Additional Material Examined

USNM: 2 spec., 53452, No Name Key, Florida Keys, in grass below 2 m, H. Hemphill!; 1 spec., 27650, Lower Matecumbe Key, Florida, H. Hemphill!; 1 spec., 1021270 [*ex* 272674], Newfound Harbor Key, Florida Keys, P. Bartsch!; 12 spec., 1021140 [*ex* 411865], N shore Key West, Florida, beach, J. B. Henderson!; 3 spec., 1021137 [*ex* 411870], Upper Matecumbe Key, Florida, beach, J. B. Henderson!; 2 spec., 411953, Key West, Florida, 4.5 fms (8 m), J. B. Henderson!; 1 spec., 412158, Tortugas, Florida, 16 fms (29 m), J. B. Henderson!; 1 spec., 668097, off Dog Id., Florida, Gulf of Mexico, near Clearwater, 4–6 fms (7–11 m), in *Astropecten articulata* stomach, Oct. 1962, G. Radwin!; 2 spec., 601681, Jamaica. (USNM specimens were separated from large suite of *Pyrgospira ostrearum* specimens.)

ANSP, as *Strictispira acurugata*: approximately 400 spec., 221823, Boot Key Harbor, Vaca Key, Florida Keys, B. R. Bales!, Jan.–March 1945, *ex* Schwengel colln. (originally identified as *Crassispira tampaensis*); approximately 75 spec., 313080 (*ex* 221702), Bonefish Key, Florida Keys, B. R. Bales!, *ex* Schwengel colln.; 1 spec., 314456, 0.5 mi. SE of Burnt Point, Crawl Key, Florida Keys, in sand pockets among weed and rock, 2–4 ft (0.5–1.25 m), V. O. Maes!, 27 April 1968 (originally identified as *Crassispira* sp.); 1 spec., 313084 (ex 264988), Boca Ciega Bay, near St. Petersburg, Florida, *ex* J. D. Parker colln.; 3 spec., 368733, Hotel, W end Grand Bahama Id., Bahama Ids., 26°42'15"N, 78°59'50"W, J. Worsfold!, *ex* Worfold colln.; 1 spec., 368499, McLean Town, Grand Bahama Id., Bahama Ids., 26°38'45"N, 77°57'30"W, 3 ft (1 m), J. Worsfold!, *ex* Worsfold colln.; 1 spec., 355797, Wardwick Wells Key, Exuma, Bahama Ids., 24°22'N, 76°36'W, intertidal sand, D. Cosman!, *ex* Cosman colln.; 5 spec., White Sound, Elbow Cay, Great Abaco Id., Bahama Ids., 26°32'N, 76°58'W, W. G. Lyons!, 1972, *ex* Lyons colln.; 1 spec. 355798, Whale Cay, Abaco Id., Bahama Ids., 26°43'N, 77°14'W, D. Cosman!, Aug. 1979, *ex* Cosman colln.; 1 spec., 329768, Bimini Lagoon, near Bailey Town, Bimini Ids., R. Robertson!, 1957–58; 6 spec., 370553, North Hawksville Creek, Bahama Ids., 26°32'N, 78°45'W, 1–3 ft (0.3–1 m), J. Worsfold!, *ex* Worsfold colln.; 2 spec., 374473, Grand Bahama Id., Bahama Ids., J. Worsfold!, *ex* Worsfold colln.; 4 spec., alcohol preserved, A9421, between Tavernier Key and channel to Tavernier Creek, Florida Keys, 25°2'N, 80°30'W, on Thalassia, 18 June 1971, *ex* Florida Marine Research Lab.

Drillia acurugata examined: USNM: holotype, 97320, Caloosahatchee Riv., Florida; 1 spec., 113153, Shell Creek, Florida; 1 spec., unnumbered, rock pit 3.5 mi. W of La Belle, Florida, N side of Caloosahatchee Riv. Author's colln: 1 spec., Caloosahatchee Riv.

Distribution

Lower west coast of Florida, Florida Keys to Tortugas, Bahamas, Bimini, Jamaica.

Discussion

Although a common, even abundant, species judging by its frequency at Abaco and its having been collected at other, rather widely separated sites, often in large numbers, *Strictispira redferni* has not been recognized as a separate species, generally being identified as small specimens of *Pyrgospira ostrearum* (Stearns, 1872), or as *Strictispira acurugata*. *Strictispira redferni* differs from *P. ostrearum* firstly by the shell of *P. ostrearum* (Fig. 18) having no parietal tubercle (although old specimens may have an accumulation of gerontic callus at this site) or varix, secondly by *P. ostrearum* being more strongly beaded, the spirals crossing more numerous and narrower ribs, being larger, taller, narrower, and by a beaded subsutural cord. However, immature specimens of *S. redferni* lacking a varix and parietal tubercle can be difficult to differentiate, although the ribs are usually wider and lack beading in *redferni*. *Pyrgospira tampaensis* (Bartsch & Rehder, 1939: 136, pl. 17, figs. 5, 13), which I consider to be a form of *P. ostrearum*, differs from *P. ostrearum* mainly in fewer axials, and subdued beading. It intergrades with *P. ostrearum*.

Maes segregated 12 lots of shells and one lot of alcohol-preserved specimens in the ANSP under the name *Strictispira acurugata* (Dall, 1890), and this was subsequently carried in Malacolog under that name. She apparently considered them living representatives of the Florida Pliocene fossil, and strictispirids on the basis of shell morphology. As her identifications have circulated, collectors have identified specimens as *S. acurugata*. Examination shows that these are not that species, but rather *S. redferni*, including a large form of that species. As seen in

Figure 9, true *S. acurugata* from the Upper Pliocene/Lower Plesitocene is larger, has a nearly flat, broad shoulder sulcus, spirals that are flat, wide bands separated by grooves rather than rounded cords, and there is no varix or parietal tubercle. There is a distinct stromboid notch, and the subsutural cord is weak, hugs the suture, and undulates with the previous ribs. The Recent "*S. acurugata*" specimens do not share these features but correspond with *S. redferni*, some being identical to the type material and of the same size, others larger, reaching 13–14 mm in length. A few (Fig. 8) resemble *S. acurugata* superficially. A large form (Fig. 7, see below) is narrow and reaches 17.5 mm. However, there is complete intergrading of forms. It is noted that Maes considered them all to be the same species.

It is worth noting that the generic position of the fossil species, assigned to *Drillia* by Dall, is in fact uncertain, appearing on the basis of the available material to more likely be of a group, such as the subfamily Cochlespirinae, which lacks a varix or an elaborated sinus at maturity. The genus *Pyrgospira* is a likely assignment.

Review of Recent ANSP material segregated as "*S. acurugata*" permits its being divided into two groups. The first consists of two lots with many specimens, 221823 and 313080. ANSP 221823 is composed of shells of rather uniform morphology (Fig. 7), mature specimens being larger (largest specimen 15.7 mm, yet an 11.5 mm specimen is still juvenile) than the type series of *S. redferni*. They are narrower, have a shallowly concave sulcus, less pronounced ribs with a tendency to intercalary axial ribs or enlarged growth markings on the body whorl. They are considered a variety of *S. redferni*. In this lot, and to a greater degree in ANSP 313080, there is intergrading with the type series. ANSP 313080 contains a number of these large forms, one of 17.5 mm, plus others of sizes to that of the type lot, all showing intergrading with the types of *S. redferni*.

Maes separated a number of specimens in good condition from each of the two lots as representative. Random selection of a number of specimens from these forms group 1. The second group consists of a number of lots showing a full range of intergrading between the first group and the type series, a number of the shells being identical to the type lot. The second group is combined with additional USNM material to form a transition grouping from the type lot to the large variety. These groups plus *Pyrgospira acuruguta* specimens were examined for possibly significant shell morphology differences, as show in Table 1.

Although the statistics for the uncommon *P. acurugata* are of limited reliability due to the low N and the fact that two, perhaps the third also, of the four specimens are immature, thus skewing shell measurements, nevertheless the findings tend to substantiate the differentiation of *S. redferni* and *Pyrgospira*? *acurugata*. *Pyrgospira acurugata* is larger, with a lower body length/shell length ratio (the 21 mm holotype is larger than the mean, 55%, but still smaller than *S. redferni*), more axials usually, fewer spirals. Qualitative rather than quantitative features are more important in differentiating these taxa, the differentiating features being noted above. (The number and character of axials is the same on the early whorls as on the mature whorls, and this is applicable to all taxa noted here.)

With regards the species generally, *S. redferni* shows a weakly defined sinus structure for the genus in that the parietal tubercle does not protrude markedly so as to narrow the sinus opening as seen in other species of the genus. However, occasional specimens of the large varietal group have more extended parietal tubercle roofs.

Maes (1983) and Kantor & Taylor (1994), who restudied Maes's material, including serial sections, described and discussed the foregut anatomy of *Strictispira paxillus*. *Strictispira redferni* can be compared with their findings. The two species are basically the same, their major features agreeing – absence of poison apparatus, large odontophore with corollary large retractor muscles, same radular tooth structure and salivary duct structure. Different is the presence of a buccal cavity area, followed by a septum, separating it from the oesophagus in *S. redferni*, as opposed to the large proboscis and essentially absent buccal tube and cavity in *S. paxillus,* in which the odontophore and radular ribbon occupy the entirety of the proboscis. In the serial-sectioned specimen of *S. redferni*, the radular structure curves from below the oesophagus, ending posterior to the buccal region behind the septum at the beginning of the oesophagus. However, in a dissected Abaco specimen, the radula was positioned at the proboscis mouth. It must be assumed that the arrangement in the specimen of *S. redferni* that was serial sectioned represents a further retracted state than that in the described specimen of *S. paxillus,* rather than an anatomical differ-

TABLE 1. *Strictispira redferni* and *Pyrgospira*? *acurugata* shell characters. N = number of specimens, M = mean, ± = standard deviation. Lower line is observed range.

	Length (mm)	Width (mm)	Body (mm)	Teleowhorls	Axials Penultimate Whorl	Spirals Body Whorl	Length/Width (%)	Length/Body (%)
Strictispira redferni (types)	N = 10 M = 10.6 ± 0.9 9.3–12.3	N = 10 M = 4 ± 0.4 3.6–4.4	N = 10 M = 6.6 ± 0.6 5.8–7.6	N = 10 M = 6.3 ± 0.3 6.0–6.75	N = 10 M = 13.5 ± 0.7 12–15	N = 10 M = 18.9 ± 1.3 16–22	N = 10 M = 37.5 ± 0.6 36–40	N = 10 M = 6.3 ± 0.9 61–69
Strictispira redferni (variety)	N = 7 M = 13.4 ± 0.6 12.4–14.8	N = 7 M = 4.8 ± 0.4 4.4–5.4	N = 7 M = 8.1 ± 0.5 7.5–9.0	N = 7 M = 7.1 ± 0.2 6.75–7.5	N = 7 M = 14.7 ± 0.8 13–16	N = 7 M = 18.4 ± 0.9 17–21	N = 7 M = 35.4 ± 0.5 33–37	N = 7 M = 60 ±0.5 57–62
Strictispira redferni (additional)	N = 14 M = 11.7 ± 1.3 9.8–14.5	N = 14 M = 4.3 ± 0.7 3.6–5.2	N = 14 M = 7.0 ± 0.8 6.3–8.1	N = 14 M = 6.7 ± 0.7 6–8	N = 14 M = 14.8 ± 1.5 12–18	N = 14 M = 18.0 ± 1.3 16–22	N = 14 M = 37 ± 0.7 35–39	N = 14 M = 60 ± 1.4 55–65
Pyrgospira acurugata	N = 4 M = 17 ± 1.3 14.3–21.0	N = 4 M = 6.6 ± 0.7 5.7–7.8	N = 4 M = 8.2 ± 1.5 6.0–11.6	N = 4 M = 8.5 ± 0.3 8–9	N = 4 M = 16.3 ± 0.2 16–17	N = 4 M = 16.0 ± 0.6 15–18	N = 4 M = 38.5 ± 0.5 37–41	N = 4 M = 45.5 ± 1.8 39–55

ence. The alimentary musculature of these animals is obviously very powerful. The shortened proboscis in *S. redferni*, in contrast to the larger organ noted in *S. paxillus*, suggests heightened retraction.

Radular studies of *S. redferni* show findings very similar to *S. paxillus*. The large, paired odontophore, robust ribbon with strong membrane are equivalent. Teeth are the same, those of *S. redferni* (Figs. 34, 35), showing only minor differences from *S. paxillus* (Fig. 37), as seen in Kantor & Taylor (1994), that of *S. paxillus* being more slender.

Of interest is the seeming discrepancy between SEM and light-transmitted images of the teeth. As seen in Figure 32, light transmitted slide preparations show the flange strongly, giving the impression that it wraps around the shaft, "collar-like". However, the SEM preparation (Fig. 33) shows the flange simply protruding slightly from underneath the shaft (arrow). Thus, the flange is shown to attach on the lower/ventral side of the tooth. McLean recognized this, as indicated by his comment that the projecting collar-like structure was on the inside (ventral side) of the tooth (1971b: 729). The attachment is sturdy, and extends from the tooth base to the flange. The depressed region on the underside of the tooth at the bend might be noted (also seen by Kantor & Taylor, 1994: fig. 2C). It appears to result from the pressure of the adjacent tooth's flange.

Etymology

The species is named for Mr. Colin Redfern, who collected the type material, and has been both generous and extremely helpful in assisting the author in this work.

Strictispira solida (C. B. Adams, 1850)
Figures 11, 24, 30, 39

Pleurotoma solida C. B. Adams, 1850: 61; Clench & Turner, 1950: 342, pl. 29, fig. 8 [lectotype designated].

Strictispira solida (C. B. Adams, 1850) – Maes, 1983: 320, text with *Strictispira paxillus*; Kaicher 1984: card 3917; Redfern, 2001: species 527, pl. 57; Malacolog, 2004, list.

Crassispira (*Crassispirella*) *fuscescens* (Reeve, 1843) – Abbott, 1958: 94 [list and description plus text; synonyms: *Pleurotoma solida* C. B. Adams, 1850, *Drillia ebenina* Dall, 1890].

Not *Drillia ebenina* Dall, 1890: 33, pl. 2, fig. 8; Abbott, 1974: 270, species 2997 [reprint of Dall's 1890 figure], as a synonym of "*Drillia* (*Clathrodrillia*) *solida*"; Malacolog, 2004, list, as synonym of *S. solida*.

Not "*Clathrodrillia solida*" (C. B. Adams, 1830 [sic]) – Rios, 1975: 130, pl., 39, fig. 583 [a misidentification, *fide* Maes, 1983: 318, "The Brasilian shell figured is *S. paxillus*"].

Not *Drillia solida* (C. B. Adams, 1850) – Bandel, 1984: 166, fig. 309, pl. 20, fig. 8.

?*Clathrodrillia solida* C. B. Adams, 1830 [sic] – Rios, 1985: 136, species 621, pl. 46 [Dall's figure of *ebenina*]; Rios, 1994: 159, species 712, pl. 53 [uncertain whether this is *S. solida* or not].

Description

Shell broadly biconic, fusiform, spire angle 37°, length approximately 19 mm, body large, somewhat truncate anteriorly, little basal constriction. Protoconch (Fig. 24) two smooth whorls, teleoconch approximately eight whorls. Sulcus narrow, concave, bearing fine spiral striae and curved sinus traces, preceded by a strong, sharply crested subsutural cord somewhat distant from suture. Whorl outline flattish below sulcus. Body whorl riding up variably on preceding whorl terminally. Sculpture of approximately 18 narrow axial ribs extending slightly onto preceding sulcus, producing a shoulder of variable strength, with wider interspaces, disappearing on base, and 7–16 regularly spaced spiral threads between axials, more prominent and wider spaced below shell periphery, producing some weak beading on crossing the axials. Enlarged axial or two forming a varix behind outer lip. Aperture parallel-sided, ending in short, open, slightly notched anterior canal bent slightly right. Lip broken back, usually healed, just following varix in about half of the specimens. Weak stromboid notch. Sinus deep, U-shaped, with parietal tubercle projecting as flat roof-like structure nearly closing opening. Color shiny black when fresh.

Animal with conventional structures externally – foot, head and siphon grayish-amber, mottled with sooty black. Tentacles with eyes placed laterally half way to tips. Rhynchostome below and midway between tentacles. Rhynchocoel large, muscular walls folded transversely and irregularly, large proboscis folded on itself. Body cavity dominated by large radular ribbon. No poison apparatus. Section

of ribbon has approximately 80 pairs of marginal teeth. Teeth (Fig. 39) approximately 190 µm, pistol-shaped, with flange near tooth base, "pistol grip" short. Operculum (Fig. 30) ovoid, with pointed anterior end and terminal nucleus.

Material Examined

Lectotype, MCZ 186005, Jamaica.

USNM: 2 spec., 27644, Lower Matecumbe Key, H. Hemphill!, identified as "*ebenina*", "type" penciled in on label (see Dall's comment concerning these specimens under Discussion below); 1 spec., 95943, Abrolhos Ids., off east Brazil; 4 spec., 102967, St. Thomas; 1 spec., 130465, Antilles, *ex* Lea colln.; 1 spec., 214978, St. Thomas, *ex* Carnegie Institute colln.; 1 spec., 366729, Jamaica?, Vendryes!, *ex* Orcutt colln.; 1 spec., 383177, Jeremie, Haiti, Orcutt colln.; 1 spec., 411903, Key West, 2 fms (3.5 m), J. B. Henderson! (identified as *Drillia ebenina*); 1 spec., 411910, Tortugas, 16 fms (29 m), J. B. Henderson!, Eolis Stn. 33, 1911 (identified as *Drillia ebenina*); 1 spec., 411911, Tortugas, 15 fms (27 m), J. B. Henderson!, Eolis Stn. 34, 1911; 1 spec., 411913a, off Miami, 10 fms (18 m), J. B. Henderson!, Eolis Stn. 70, 1913; 1 spec., 411914, Key West, J. B. Henderson!, Eolis Stn. 73 (identified as *Drillia ebenina*); 1 spec., 411915, off Government Cut, Miami, Florida, 3 fms (5.5 m), J. B. Henderson!, Eolis Stn. 83, 1913; 1 spec., 411918, Santa Lucia, Cuba, 2–4 fms (3.5–7 m), Barrera Exp., Stn. 200; 1 spec., 411920, Cabanas Harbor, 25 fms (45 m), Barrera Exp., Stn. 202; 1 spec., 411921, Cabanas Harbor, Cuba, 3–12 fms (5.5–21.5 m), Barrera Exp., Stn. 203: 5 spec., 411922, Santa Rosa, Cuba, 3–6 fms (5.5–11 m), Barrera Exp., Stn. 209; 10 spec., 411923, Esperanza, Cuba, 2–3 fms (3.5–5.5 m), Barrera Exp., Stn. 210; 1 spec., 411924, Cape San Antonio, Cuba, Barrera Exp., Stn. 224; 1 spec., 843357, off west Florida (Naples), 26°03'11"N, 82°27'27"W, 17 m, Continental Shelf Associates for MMS/BLM, scuba, 1 June 1983; 1 spec., 900421, Peanut Id., Lake Worth, Florida, 3 May 1969; 1 spec., 900422, SW of Key West, 114 fms (205 m), R. Black!, 1975; 2 spec., Finger Channels, off Stiltsville, Miami, Florida, 2–3 ft (0.5–1 m); 1 spec., 900424, W side of Fleming Id., Key West, Florida, 16 ft (4.8 m), 22 Sept. 1995; 1 spec., 900425, E side Marquesas Keys, Florida Keys, 12 ft (3.5 m), scuba at night, 12 July 1991; 1 spec., 900426, Tourmaline Reef, Mayaguez, Puerto Rico, 40 ft (12 m), 10 March 1993; 1 spec., 900427, Isla Morro, Pelotas, Venezuela, 24 ft (7 m); 1 spec., 900428, Cayo Levisa, Oriente, Cuba, 15 ft (4.5 m), scuba at night, 7 Aug., 1995; 1 spec., 900429, Isla Coche, Venezuela, 50 ft (15 m), scuba at night, 16 July 1993; 3 spec., 1004124, W side Fleming Id., Key West, Florida, 20 ft (6 m), scuba at night, 20 Dec., 1995; 3 spec., 1004125, Tambor Cay, Atlantic Panama, 40 ft (12 m), scuba at night, 11 Oct. 1992 (last ten lots *ex* author's colln.)

ANSP: 1 spec., 84478, St. Johns, Antigua, Silas L. Schumo!, 1903; 1 spec., 194117, off Garden Cove, Key Largo, Florida, 3 fms (5.4 m), T. L. Moise!; 1 spec., 198968, NW of Water Pt., North Sound, Grand Cayman Id., A. J. Ostheimer 3rd!, Stn. D31; 1 spec., 232571, off Palm Beach, Florida, J. S. Schwengel!, 24 April 1940; 1 spec., 281650, SE end of McBride Cay, Belize, Stn. 106, R. Robertson!, 25 Aug. 1961; 1 spec., 282214, mouth of Monkey Riv., Belize, 12 ft (3.5 m), coarse quartz sand, 16°21'45"N, 88°29'00"W, R. Robertson!, 21 Aug. 1961; 4 spec., 284033, off mouth of Mullins Riv., Belize, Stn. 62, R. Robertson!, 1–2 Aug. 1961; 1 spec., 313036, outer beaches, Guantanamo Bay, Cuba, R. T. & S. Abbott!, May 1947; 1 spec., 313083 (*ex* 221702, split from lot of *Crassispira cubana*), Bonefish Key, Florida, J. S. Schwengel!; 1 spec., 320964, St. Thomas, W. I., R. Swift!; 1 spec., 337481, Key West, Florida, C. L. Richardson!; 1 spec., 368352, Tamarind, Grand Bahama Id., 26°30'45"N, 78°36'01"W, J. Worsfold!, *ex* Worsfold colln.; 2 spec., 368588, Settlement Pt., W end, Grand Bahama Id., 1 ft (0.3 m), live, at night, J. Worsfold!; 13 spec., 368728, hotel, W end, Grand Bahama Id., 2–4 ft (0.5–1.2 m), live, on sand and rocks, at night, J. Worsfold!; 4 spec., 374475, Grand Bahama Id., J. Worsfold!

Drillia ebenina examined: USNM: figured syntype , 97318, plus 10 further syntypes of same lot, one larger than figured specimen, Caloosahatchee Riv., Florida, Pliocene; 3 spec., 23983, Caloosahatchee Riv., Pliocene; 5 (of 9) spec., 113150, Shell Creek, Florida, Pliocene; ANSP: large batch, 18058, N. St. Petersburg, Florida, Pliocene, W. G. Fargo!, 8 Oct. 1946, *ex* Fargo colln.; 1 spec., 58371, no locality, 21 Mr. 1984.

Author's colln.: 2 spec., Pinecrest beds, Sarasota, Florida, Middle Pliocene.

Distribution

Palm Beach to Miami, Florida, to Florida Keys and Tortugas; off Naples, west Florida, Florida Bay (Tabb & Manning, 1961: 581, list, as *Crassispira ebenina*); Bahamas, Cuba, Grand Cayman, Jamaica, Puerto Rico, St. Thomas, Antigua; Belize, Colombia (Diaz & Puyana, 1994: 222, species 875, description and fig., as *Crassispira* (*Strictispira*) cf. *solida*, and Diaz, 1994: 40, list, as *Strictispira solida*), Venezuela, Brazil.

Discussion

Crassispira ebenina has been confused with *S. solida* for many years. It is probable that literature records of Recent specimens of the fossil *C. ebenina* are in all likelihood *S. solida*, and that position is adopted here. *Drillia ebenina* was described by Dall from the Upper Pliocene-Lower Pleistocene of Florida, and was considered by him as Recent also. He noted it found in shallow water in the Florida Keys by Hemphill, and gave it a distribution of Gulf of Mexico from Florida to Vera Cruz. Except for reporting one specimen from Puerto Rico (Dall & Simpson, 1901: 387), Dall did not mention *S. solida*. Other authors (e.g., Mazyck, 1913: 8; Abbott, 1954: 268; Tabb & Manning, 1961: 581) continued this identification, considering *D. ebenina* as Recent, listing it from S. Carolina, E. Florida, the West Indies. For whatever reason, *S. solida* was not considered a valid or important species. It was listed only (Krebs, 1864: 12; Simpson, 1887: 54), or considered a synonym of *Crassispirella fuscescens* (Reeve, 1843) (Tryon, 1884: 193; Abbott, 1958: 94; Warmke & Abbott, 1962: 134). Finally, Abbott (1974: 270) considered *S. solida* a valid species, nevertheless considering *C. ebenina* a synonym. Abbott's 1958 misidentification of *S. solida* as *C. fuscescens* is based upon ANSP 198968 from Grand Cayman Island. Abbott included a slip with the shell stating, [it] "matches *solida* CBA OK". Maes indicated this was written approximately 1957. The shell is *S. solida*, and was determined as that by Maes (5 Oct. 1977). It measures 14.6 x 6.2 mm, and is a typical specimen. It appears Abbott recognized the shell as *S. solida*, but through some error reported it as *S. fuscescens* in the publication. Comparison of *S. solida* and *C. ebenina* (Figs. 11, 13) shows that they are not conspecific. Although similar in appearance, the sinus of *C. ebenina* is not strictispirid but crassispirine, probably a member of the genus *Glossispira*, at least on the basis of the sinus and parietal tubercle structure (McLean, 1971a: 121; 1971b: 720) (see previous comment about conventional crassispirid subgenera). The shell of *Glossispira ebenina* is broader (although there are narrower forms, otherwise identical), there are more axial ribs, the spirals are more robust, and the subsutural cord is somewhat weaker, slightly rounded, and weakly beaded.

For separation of *S. solida* from *C. fuscescens*, see features for *C. fuscescens* noted above with *S. drangai* and *S. paxillus*. Additionally, *C. fuscescens*, has a non-crested subsutural cord. Separation from *S. drangai* is also discussed above.

Strictispira solida may be differentiated from *S. paxillus* by its larger size, narrowly concave sulcus, fewer and more robust, orthocline axial ribs, and stronger, sharply crested subsutural cord a bit distant from the suture. A common species, *Pleurotoma solida* was assigned to the genus *Strictispira* by Maes (1983: 320) in the text with *Pleurotoma paxillus*, which she had discovered to be strictispirid by virtue of its radular teeth, although the radula of *S. solida* was not mentioned. However, her identification card includes a photograph of a radular slide preparation of a specimen of *S. solida* showing pairs of marginal teeth of strictispirid form (ANSP 282214). The radular study shown here confirms this assignment, the radular teeth being typical of the genus. The basal segment is slightly less flexed and a bit shorter than typical of the genus. This is seen in Maes's slide figure also. This is not to the degree seen in the eastern Pacific sister genus *Cleospira*, as illustrated in McLean (1971a: fig. 88), wherein the flexing is still less and the flange less prominent. Bandel's figures of what is purported to be *S. solida* do not conform to the present findings, but rather show teeth very much like those of *Cleospira*. At this time, no representatives of *Cleospira* are known in the western Atlantic. Bandel does not figure or describe the shell(s) identified as *S. solida*, consequently in view of his radular findings, it is possible that there is a form of the genus *Cleospira* in this region.

CONCLUSIONS

The discovery of the existence of five or six species of *Strictispira* in the western Atlantic demonstrates that the genus is more common than realized, and more morphologically diverse. It is likely that further members of the group will be recognized upon availability and study of the animals.

The strictispirid radular structure findings further suggest, as stated by Taylor et al. (1993), that the feeding mechanism of the strictispirids involves rasping and tearing of prey by a protruding radula. In the present species, the radula can be protruded through the buccal cavity to the anterior proboscis, as with *S. paxillus* (Maes, 1983: 320; Kantor & Taylor, 1994: 343), thereby obtaining access to the prey. The radula could serve as a grasping organ, assisting in propelling food to the buccal cavity and oesophagus by the teeth splaying out after crossing the bending plane and then coming together, like Maes's "ice-tongs" metaphor, in a grasp of the prey on retraction. No food remnants were present in examined specimens.

The protoconch structure indicates direct development, consequently there would probably be no planktonic dispersion. This suggests that there is higher likelihood of different forms having developed from common ancestors.

It is evident that correct systematic assignment of crassispirine-like taxa requires knowledge of the animal, especially radular information. Correct generic location of *S. quadrifasciata*, *S. redferni*, and *S. coltrorum* would not have been suspected without the radula. There is no specific shell morphology that signifies the genus *Strictispira*, although the members do usually share a drilliiform shell with a strictspirid sinus structure. Until the radula is known, generic location can be assigned only on a tentative basis.

There is little available information concerning habitat, shallow, rocky areas with sand and occasionally vegetation being the reported features. Usually of shallow water, *S. solida* was dredged at 200 m.

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